

ment of chlorophyll in the cortex of the new tuber, the metabolic changes have been accompanied by no increase of substance. On the contrary, it is probable that, owing to respiration, the dry weight of the parts is less than that of the original piece of tuber.

Part of the food elaborated and digested in the leaves of the parent plant was translocated to the tuber of which the piece in FIGURE I was a part. After the portion in question was cut off and placed in the conservatory this stored food began to be redigested and translocated to the developing "eye" or bud. There has been, then, merely a transfer of substance from the cells of the old tuber to the cells which ultimately developed the new.

Normally this awakened bud would presumably have given rise to an aerial leafy branch. The causes of its development into a tuber are difficult to recognize. Environmental conditions were not such as have favored tuberization in recorded experiments, and internal causes are still more difficult to assign.

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A NEW CHESTNUT DISEASE*

BY WILLIAM A. MURRILL

A new and very serious disease of our native chestnut is epidemic in many parts of New York City and threatens to destroy practically all the chestnut trees in this vicinity. A field survey has not yet been undertaken, but the disease is known to occur also in New Jersey, Maryland, the District of Columbia and Virginia.

An investigation of the disease was begun at the New York Botanical Garden nearly a year ago, and most of the facts regarding it are now in our possession. Pure cultures of the fungus

* Murrill, W. A. A serious chestnut disease. *Jour. N. Y. Bot. Garden* 7: 143-153. *f.* 13-19. June, 1906.

Merkel, H. W. A deadly fungus on the American chestnut. *Ann. Rept. N. Y. Zool. Society* 10: 97-103. July, 1906. [Illust.]

Murrill, W. A. Further remarks on a serious chestnut disease. *Jour. N. Y. Bot. Garden* 7: 203-211. *f.* 25-30. September, 1906.

were obtained from affected chestnut twigs in November and cultivated on various nutrient media until early in the spring, when inoculations were made into several young chestnut trees in the propagating houses; on all of which the disease has appeared in its normal condition during the present season and fruited abundantly. All of the twigs inoculated have died, the others remaining perfectly healthy. All attempts to introduce the fungus into a tree without an abrasion of the surface of the twig have failed.

The fungus enters through a wound or dead limb and works beneath the cortex in the layers of the inner bark and cambium. The bark soon dies and changes color and later becomes rough and warty from the presence of numerous yellowish-brown fruiting pustules, which appear in the lenticels and send out peculiar twisted spore-masses containing millions of minute summer spores. These spores are produced continuously throughout the summer and early autumn and germinate without a period of rest when they fall upon wounds in other chestnut trees.

The winter spores mature in late autumn in the same pustules and germinate the following spring, when the mycelium which has passed the winter in the infected branch also begins to grow again and continues to spread beneath the cortex, sending up fruiting pustules and distributing spores as in the previous season.

The fungus attacks twigs, branches and trunks of chestnut trees, irrespective of size or position, and usually proceeds in a circle about the affected portion until it is completely girdled. The death of the end of a branch necessarily causes loss of vitality and partial death to the remainder, and this enables the fungus to spread very rapidly through the tissues below until it reaches the main trunk, when the life of the tree is measured by a few years at best.

The mycelium of the fungus is unfortunately so active and so well protected that no treatment can be suggested except the rigorous use of the pruning knife; and this has many limitations. Spraying solutions will not avail, since they do not reach the fungus and cannot possibly kill the countless numbers of spores continually produced; nor will they protect the surface from

wounds and other openings through the bark into which spores are liable to fall and germinate.

Old trees badly affected — and there are many of this description in New York — are not worth the trouble even of pruning ; the sooner they are cut and burned the better.

Large trees with only a few branches affected might be saved for several years by cutting away these branches a foot or more below the affected area and coating the cut surface with coal-tar or other suitable substance. The same treatment may be applied to vigorous young trees with much more prospect of success.

My observations in the Bronx this season have led me to take a gloomy view regarding the immediate future of the chestnut here. The disease seems destined to run its course, as epidemics usually do, and it will hardly be safe to plant young trees while the danger of infection is so great.

The fungus in question appears to be confined to our native

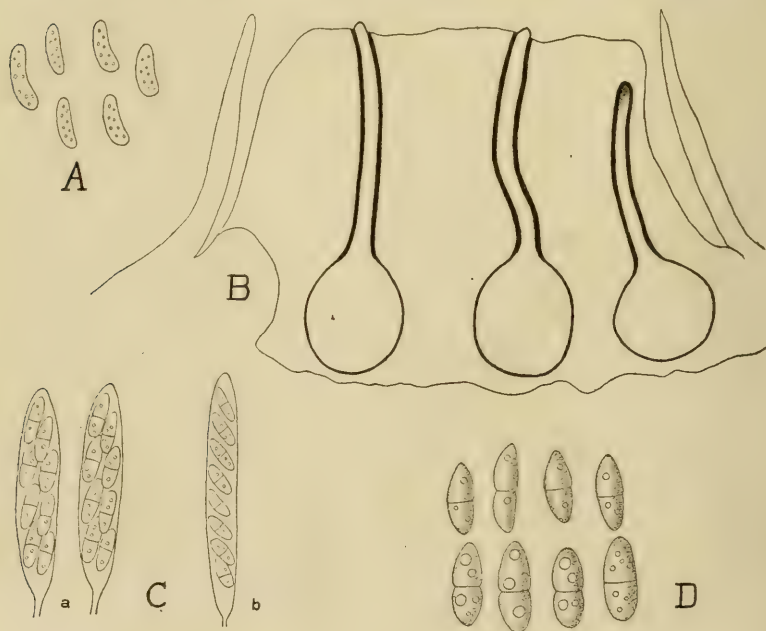


FIG. 2. *A*, Summer spores. *B*, Pustule in section showing perithecia. *C*, Asci with sporidia : *a*, usual form ; *b*, form rarely found. *D*, Sporidia.

chestnut. A related species occurring on the European chestnut is quite different in character and totally different in habit. I have shown specimens to many mycologists, both in Europe and America, and they all pronounce it new to them and undescribed. It belongs to *Diaporthe*, a large genus of the pyrenomyces, whose species are as a rule confined to dead wood and are not parasitic. The name I have chosen refers to its very destructive parasitic habit. A detailed description follows :

***Diaporthe parasitica* sp. nov.**

Pustules numerous, erumpent, at first yellow, changing to brown at maturity : perithecia usually 10–20 in number, closely clustered, flask-shaped, deeply imbedded in the stroma in the inner bark, scarcely visible to the unaided eye ; necks long, slender, curved, with thick black walls and rather prominent ostiola : asci oblong-clavate, $45-50 \times 9 \mu$, 8-spored ; sporidia usually biseriata, hyaline, oblong, rounded at the ends, often slightly constricted, uniseptate, $9-10 \times 4-5 \mu$. Summer spores very minute, $1 \times 2-3 \mu$, pale-yellowish, cylindrical, slightly curved, discharged in twisted threads as in *Cytospora*.

Found upon living or recently killed branches of the American chestnut, *Castanea dentata*. Type collected by W. A. Merrill in Bronx Park, N. Y. City, November 26, 1905. Known also from New York, New Jersey, Maryland, the District of Columbia and Virginia.

NEW YORK BOTANICAL GARDEN.

SHORTER NOTES

A NEWLY INTRODUCED PLANT IN RHODE ISLAND. — Some eight or ten years ago, as near as I can recall, there appeared on wasteland, near our general passenger station in Providence, a few plants of *Grindelia squarrosa*, belonging, as every one knows, in the far West. There are now several acres of the plant here, and its increase is deterred only by building operations in the neighborhood. If offences must come, in the shape of weeds, it is well to have them handsome — and this *Grindelia* with its globular, many-scaled, sticky involucre and light golden rays, is a beauty. In the same region the Russian thistle has a hold and